Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of the claims in the applications.

Listing of Claims

Claim 1 (Withdrawn): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region.

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Claim 2 (Withdrawn): The waveguide photodetector of claim 1, further comprising the fabrication of a transistor body at the same time as the fabrication of the silicon of the heterojunction.

Claim 3 (Withdrawn): The waveguide photodetector of claim 1, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region.

Claim 4 (Canceled).

Claim 5 (Currently Amended): ~~The waveguide photodetector of claim 1~~A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region, wherein the cladding further comprises: a bottom cladding, a side cladding and a top cladding, where each of the claddings is comprised of a plurality of dielectric materials.

Claim 6 (original): The waveguide photodetector of claim 5, wherein one of the plurality of dielectric materials comprising a layer of side cladding is formed from the same film as a dielectric component of a transistor, where the dielectric component is selected from a group comprising: an inter-layer dielectric film, a gate spacer, a silicide block, a dielectric spacer, a passivation film, an isolation dielectric and a field oxide.

Claim 7 (original): The waveguide photodetector of claim 5, wherein one of the plurality of

dielectric materials comprising a layer of top cladding is formed from the same film as a dielectric component of a transistor, where the dielectric component is selected from a group comprising: an inter-layer dielectric film, a gate spacer, a silicide block, a dielectric spacer and a passivation film.

Claim 8 (original): The waveguide photodetector of claim 5, wherein the bottom cladding is comprised of the insulating layer of a substrate, where the substrate is selected from the group comprising: silicon on insulator (SOI), silicon on sapphire (SOS) and a silicon membrane (also known as silicon on nothing, SON).

Claim 9 (original): The waveguide photodetector of claim 5, further comprising the fabrication of the insulator of a SOI substrate of an integrated circuit at the same time as the fabrication of the bottom cladding of the waveguide.

Claim 10 (original): The waveguide photodetector of claim 9, wherein the integrated circuit is selected from the group comprising: a CMOS integrated circuit, a BiCMOS integrated circuit and a bipolar junction integrated circuit.

Claim 11 (Withdrawn): The waveguide photodetector of claim 1, wherein at least one of the plurality of dielectric materials is selected from the group comprising: SiO_2, SiCOH, SiCOF, Si_3N_4, SiON, BPSG and silicon-based materials including one or more of the following elements: oxygen, carbon, nitrogen, hydrogen, boron, phosphorus, fluorine and arsenic.

Claim 12 (Currently Amended): ~~The waveguide photodetector of claim 1~~A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region, wherein each of the second plurality of conductive contacts comprises:

an ohmic contact to the silicon of the heterojunction, and

a conductive plug with a first terminal coupled to the ohmic contact and a second terminal coupled to a metal layer of an integrated circuit.

Claim 13 (original): The waveguide photodetector of claim 12, wherein the conductive plug is formed simultaneously with the metal layer.

Claim 14 (original): The waveguide photodetector of claim 12, further comprising the fabrication of an ohmic contact on a terminal region of a transistor at the same time as the fabrication of an ohmic contact on the silicon of the heterojunction, where the terminal region of a transistor is selected from a group comprising: a source, a drain, a gate and a body.

Claim 15 (original): The waveguide photodetector of claim 12, further comprising the fabrication of a conductive plug to an ohmic contact of a transistor at the same time as the fabrication of a conductive plug to an ohmic contact to the silicon of the heterojunction.

Claim 16 (original): The waveguide photodetector of claim 12, wherein an ohmic contact is comprised of a metal silicide.

Claim 17 (original): The waveguide photodetector of claim 12, wherein a conductive plug is comprised of tungsten.

Claim 18 (original): The waveguide photodetector of claim 12, further comprising fabrication of a local interconnection between a pair of transistors, at the same time as fabricating a local interconnection for coupling an ohmic contact on the silicon of the heterojunction with an ohmic contact on a transistor.

Claim 19 (original): The waveguide photodetector of claim 18, wherein the local interconnection is comprised of a material selected from the group comprising: tungsten and aluminum.

Claim 20 (Currently Amended): ~~The waveguide photodetector of claim 1~~A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region, wherein at least one contact of the pluralities of contacts is coupled to a metal layer on an integrated circuit, where the metal layer has a coupling to an element on the integrated circuit and where the element is selected from the group comprising: a capacitor, a resistor, an inductor, a diode, a transistor and a bond pad.

Claim 21 (Currently Amended): ~~The waveguide photodetector of claim 1~~, A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region wherein each of the first plurality of

conductive contacts comprises:

an ohmic contact to the germanium of the heterojunction, and

a conductive plug with a first terminal coupled to the ohmic contact and a second terminal coupled to a metal layer of an integrated circuit.

Claim 22 (Currently Amended): ~~The waveguide photodetector of claim 1~~A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region, further comprising the introduction of a plurality of dopants into a plurality of regions in the silicon of the heterojunction.

Claim 23 (original): The waveguide photodetector of claim 22, further comprising the introduction of a plurality of dopants into a plurality of regions in the silicon body of a transistor at the same time as the introduction of the plurality of dopants into a plurality of regions in the silicon of the heterojunction.

Claim 24 (Currently Amended): ~~The waveguide photodetector of claim 1~~A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the depletion region, further comprising the introduction of a plurality of dopants into a plurality of regions in the germanium of the heterojunction.

Claim 25 (Currently Amended): ~~The waveguide photodetector of claim 1~~A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole

pairs caused by photons absorbed in the depletion region, further comprising the introduction of a first plurality of dopants into a plurality of regions in the silicon of the heterojunction, and the introduction of a second plurality of dopants into a plurality of regions in the germanium of the heterojunction.

Claim 26 (original): The waveguide photodetector of claim 25, wherein the first plurality of dopants is comprised of dopants with electrical charge opposite to the polarity of the dopants comprising the second plurality of dopants.

Claim 27 (original): The waveguide photodetector of claim 25, wherein the first plurality of dopants is comprised of dopants with electrical charge equal to the polarity of the dopants comprising the second plurality of dopants.

Claim 28 (Currently Amended): ~~The waveguide photodetector of claim 1~~A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials, a first plurality of conductive contacts coupled to said germanium layer, and a second plurality of conductive contacts coupled to said silicon layer, wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole

pairs caused by photons absorbed in the depletion region, further comprising an input to the waveguide photodetector.

Claim 29 (original): The waveguide photodetector of claim 28, further comprising a silicon waveguide with an input and an output, where the output of the silicon waveguide is coupled to the input of the waveguide photodetector.

Claim 30 (previously presented): The waveguide photodetector of claim 28, further comprising:

a silicon waveguide with an input and an output; and,

a mode converter with an input and an output, where the output of the mode converter is coupled to the input of the waveguide photodetector, and where the input to the mode converter is coupled to the output of the silicon waveguide.

Claim 31 (original): The waveguide photodetector of claim 30, wherein the mode converter is comprised of a polysilicon optical structure.

Claim 32 (original): The waveguide photodetector of claim 31, further comprising the fabrication of a polysilicon gate for a transistor at the same time as the fabrication of the polysilicon optical structure.

Claim 33 (original): The waveguide photodetector of claim 30, wherein the mode converter is comprised of a plurality of dielectric structures introduced in substantial proximity to the input to

the waveguide photodetector.

Claim 34 (Currently Amended): The waveguide photodetector of any of claims [[2,]] 6, 7, 10, 14, 15, 18, 20, 21, 23 and 32, wherein the transistor is selected from the group comprising: a CMOS transistor, a BiCMOS transistor, a bipolar junction transistor (BJT) and a junction FET (JFET) transistor.

Claim 35 (original): The waveguide photodetector of claim 34, wherein the CMOS transistor is selected from the group of transistors comprising: a fully depleted CMOS transistor, a partially depleted CMOS transistor, a floating body CMOS transistor and a body tied CMOS transistor.

Claim 36 (Withdrawn): A method for communicating signals to a semiconductor device using optical signals comprising:

sending an optical signal to an input of a germanium on silicon waveguide photodetector located on a semiconductor chip, said germanium on silicon waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials;

an optical input;

a first plurality of conductive contacts coupled to said germanium layer; and

a second plurality of conductive contacts coupled to said silicon layer; and,

outputting an electrical signal through at least one of the second plurality of conductive contacts of the germanium on silicon waveguide photodetector to the input of a semiconductor device located on the semiconductor chip.

Claim 37 (Withdrawn): A method for communicating signals to a semiconductor device using optical signals comprising:

receiving an optical signal at an input of a germanium on silicon waveguide photodetector located on a semiconductor chip, said germanium on silicon waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials;

an optical input;

a first plurality of conductive contacts coupled to said germanium layer; and

a second plurality of conductive contacts coupled to said silicon layer; and,

outputting an electrical signal through at least one of the second plurality of conductive contacts of the germanium on silicon waveguide photodetector to the input of a semiconductor device located on the semiconductor chip.

Claim 38 (previously presented): A semiconductor chip comprising:

a germanium on silicon waveguide photodetector located on the semiconductor chip, said germanium on silicon waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction stack comprising:

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and

a cladding comprised of a plurality of dielectric materials;

an optical input;

a first plurality of conductive contacts coupled to said germanium layer; and

a second plurality of conductive contacts coupled to said silicon layer; and,

inputs for receiving optical signals;

outputs for outputting electrical signals;

and,

a semiconductor device connected to the germanium on silicon waveguide photodetector outputs and located on the semiconductor chip.

Claim 39 (previously presented): A data structure representation of a germanium on silicon waveguide photodetector, the data structure representation comprising:

a data structure representation of a waveguide comprising:

a data structure representation of a core comprised of a germanium on silicon heterojunction stack, the germanium on silicon heterojunction stack comprising :

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and,

a data structure representation of a cladding comprised of a plurality of dielectric materials; and,

a data structure representation of a first plurality of conductive contacts coupled to the germanium, and

a data structure representation of a second plurality of conductive contacts coupled to the silicon.

Claim 40 (original): The data structure representation of a germanium on silicon waveguide photodetector as claimed in claim 39, wherein the data structure representation is selected from a list consisting of a component in a software library having a fixed specification for an integrated circuit netlist, a netlist, a CAD (computer-aided design) representation, and a hardware definition language representation.

Claim 41 (original): The data structure representing a germanium on silicon waveguide photodetector as claimed in claim 39, wherein the data structure further represents an integrated circuit.

Claim 42 (previously presented): A plurality of maskworks comprising a pattern of opaque and transparent areas adapted to define a germanium on silicon waveguide photodetector comprising;

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, stack comprising :

a silicon layer comprising substantially silicon for conducting light, and

a germanium layer comprising substantially germanium for conducting light; and,

a cladding comprised of a plurality of dielectric materials.

a first plurality of conductive contacts coupled to the germanium, and

a second plurality of conductive contacts coupled to the silicon.

Claim 43 (original): The maskwork for creating a germanium-on-silicon waveguide photodetector as claimed in claim 42, wherein the maskwork can be used to create an integrated circuit.

Claim 44 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

cladding comprised of a plurality of dielectric materials,

a first plurality of conductive contacts coupled to the germanium and not coupled to the silicon;

a second plurality of conductive contacts coupled to the silicon and not coupled to the germanium, and wherein said first plurality of conductive contacts are displaced from said second plurality of conductive contacts; and,

a transistor body fabricated at the same time as the fabrication of the silicon of the heterojunction.

Claim 45 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction wherein the germanium on silicon heterojunction forms a diode structure with a depletion region, where the diode structure is capable of producing and separating electron hole pairs caused by photons absorbed in the

depletion region, and

a cladding comprised of a plurality of dielectric materials; and,

a first plurality of conductive contacts coupled to the germanium; and,

a second plurality of conductive contacts coupled to the silicon.

Claim 46 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

a cladding comprised of:

a bottom cladding;

a side cladding; and,

a top cladding, wherein each of the claddings is comprised of a plurality of dielectric materials;

a first plurality of conductive contacts coupled to the germanium, and

a second plurality of conductive contacts coupled to the silicon.

Claim 47 (previously presented): The waveguide photodetector of claim 46, wherein one of the plurality of dielectric materials comprising a layer of top cladding is formed from the same film as a dielectric component of a transistor, where the dielectric component is selected from a group comprising: an inter-layer dielectric film, a gate spacer, a silicide block, a dielectric spacer and a passivation film.

Claim 48 (previously presented): The waveguide photodetector of claim 46, wherein the

bottom cladding is comprised of the insulating layer of a substrate, where the substrate is selected from the group comprising: silicon on insulator (SOI), silicon on sapphire (SOS) and a silicon membrane (also known as silicon on nothing, SON).

Claim 49 (previously presented): The waveguide photodetector of claim 46, further comprising the fabrication of the insulator of a SOI substrate of an integrated circuit at the same time as the fabrication of the bottom cladding of the waveguide.

Claim 50 (previously presented): The waveguide photodetector of claim 49, wherein the integrated circuit is selected from the group comprising: a CMOS integrated circuit, a BiCMOS integrated circuit and a bipolar junction integrated circuit.

Claim 51 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

a cladding comprised of a plurality of dielectric materials,

a first plurality of conductive contacts coupled to the germanium, and

a second plurality of conductive contacts coupled to the silicon wherein each of the second plurality of conductive contacts comprises:

an ohmic contact to the silicon of the heterojunction, and

a conductive plug with a first terminal coupled to the ohmic contact and a second terminal coupled to a metal layer of an integrated circuit.

Claim 52 (previously presented): The waveguide photodetector of claim 51, wherein the conductive plug is formed simultaneously with the metal layer.

Claim 53 (previously presented): The waveguide photodetector of claim 51, further comprising the fabrication of an ohmic contact on a terminal region of a transistor at the same time as the fabrication of an ohmic contact on the silicon of the heterojunction, where the terminal region of a transistor is selected from a group comprising: a source, a drain, a gate and a body.

Claim 54 (previously presented): The waveguide photodetector of claim 51, further comprising the fabrication of a conductive plug to an ohmic contact of a transistor at the same time as the fabrication of a conductive plug to an ohmic contact to the silicon of the heterojunction.

Claim 55 (previously presented): The waveguide photodetector of claim 51, wherein an ohmic contact is comprised of a metal silicide.

Claim 56 (previously presented): The waveguide photodetector of claim 51, wherein a conductive plug is comprised of tungsten.

Claim 57 (previously presented): The waveguide photodetector of claim 51, further comprising fabrication of a local interconnection between a pair of transistors, at the same time as fabricating a local interconnection for coupling an ohmic contact on the silicon of the

heterojunction with an ohmic contact on a transistor.

Claim 58 (previously presented): The waveguide photodetector of claim 57, wherein the local interconnection is comprised of a material selected from the group comprising: tungsten and aluminum.

Claim 59 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

a cladding comprised of a plurality of dielectric materials,

a first plurality of conductive contacts coupled to the germanium and not coupled to the silicon, and,

a second plurality of conductive contacts coupled to the silicon and not coupled to the germanium, wherein:

said first plurality of conductive contacts are displaced from said second plurality of conductive contacts; and,

at least one contact of the pluralities of contacts is coupled to a metal layer on an integrated circuit, where the metal layer has a coupling to an element on the integrated circuit and where the element is selected from the group comprising: a capacitor, a resistor, an inductor, a diode, a transistor and a bond pad.

Claim 60 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

a cladding comprised of a plurality of dielectric materials,

a first plurality of conductive contacts coupled to the germanium wherein each of the first plurality of conductive contacts comprises:

an ohmic contact to the germanium of the heterojunction, and

a conductive plug with a first terminal coupled to the ohmic contact and a second terminal coupled to a metal layer of an integrated circuit, and;

a second plurality of conductive contacts coupled to the silicon.

Claim 61 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction wherein a plurality of regions in the silicon of the heterojunction comprise a plurality of dopants introduced at the same time as the introduction of a plurality of dopants into a plurality of regions in the silicon body of a transistor, and

a cladding comprised of a plurality of dielectric materials;

a first plurality of conductive contacts coupled to the germanium and not coupled to the silicon; and,

a second plurality of conductive contacts coupled to the silicon and not coupled to the germanium, and wherein said first plurality of conductive contacts are displaced from said second plurality of conductive contacts.

Claim 62 (canceled).

Claim 63 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction wherein a plurality of regions in the silicon of the heterojunction comprise a first plurality of dopants and a plurality of regions in the germanium of the heterojunction comprise a second plurality of dopants and, wherein the first plurality of dopants is comprised of dopants with electrical charge opposite to the polarity of the dopants comprising the second plurality of dopants; and,

a cladding comprised of a plurality of dielectric materials; and,

a first plurality of conductive contacts coupled to the germanium; and,

a second plurality of conductive contacts coupled to the silicon.

Claim 64 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction wherein a plurality of regions in the silicon of the heterojunction comprise a first plurality of dopants and a plurality of regions in the germanium of the heterojunction comprise a second plurality of dopants and, wherein the first plurality of dopants is comprised of dopants with electrical charge equal to the polarity of the dopants comprising the second plurality of dopants; and,

a cladding comprised of a plurality of dielectric materials; and,

a first plurality of conductive contacts coupled to the germanium; and,

a second plurality of conductive contacts coupled to the silicon.

Claim 65 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

a cladding comprised of a plurality of dielectric materials,

a first plurality of conductive contacts coupled to the germanium;

a second plurality of conductive contacts coupled to the silicon;

an input to the waveguide photodetector;

a silicon waveguide with an input and an output; and,

a mode converter with an input and an output, where the output of the mode converter is coupled to the input of the waveguide photodetector, and where the input to the mode converter is coupled to the output of the silicon waveguide.

Claim 66 (previously presented): The waveguide photodetector of claim 65, wherein the mode converter is comprised of a polysilicon optical structure.

Claim 67 (previously presented): The waveguide photodetector of claim 66, further comprising the fabrication of a polysilicon gate for a transistor at the same time as the fabrication of the polysilicon optical structure.

Claim 68 (previously presented): The waveguide photodetector of claim 65, wherein the mode converter is comprised of a plurality of dielectric structures introduced in substantial proximity to the input to the waveguide photodetector.

Claim 69 (previously presented): The waveguide photodetector of any of claims 6, 44, 47, 50, 53, 54, 57, 59, 60, 61 and 67, wherein the transistor is selected from the group comprising: a CMOS transistor, a fully depleted CMOS transistor, a partially depleted CMOS transistor, a floating body CMOS transistor and a body tied CMOS transistor.

Claim 70 (previously presented): A data structure representation of a germanium on silicon waveguide photodetector, the germanium on silicon waveguide photodetector comprising:

a data structure representation of a waveguide comprising:

a data structure representation of a core comprised of a germanium on silicon heterojunction, and

a data structure representation of a cladding comprised of a plurality of dielectric materials.

a data structure representation of a first plurality of conductive contacts coupled to the germanium, and

a data structure representation of a second plurality of conductive contacts coupled to the silicon

wherein the data structure representation of a germanium on silicon waveguide photodetector is selected from a list consisting of a component in a software library having a fixed specification for an integrated circuit netlist, a netlist, a CAD (computer-aided design) representation, and a hardware definition language representation.

Claim 71 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

cladding comprised of a plurality of dielectric materials,

a first plurality of electrical contacts coupled to the germanium;

a second plurality of electrical contacts coupled to the silicon; and,

a transistor body fabricated at the same time as the fabrication of the silicon of the heterojunction and wherein the transistor body is external to the waveguide and displaced from the waveguide.

Claim 72 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction, and

a cladding comprised of a plurality of dielectric materials,

a first plurality of conductive contacts coupled to the germanium, and

a second plurality of conductive contacts coupled to the silicon wherein at least one contact of the pluralities of contacts is electrically coupled to a metal layer on an integrated circuit, where the metal layer has an electrical coupling to an electronic element on the integrated circuit, and where the electronic element is external to the waveguide and displaced from the waveguide, and wherein the electronic element is selected from the group comprising: a capacitor, a resistor, an inductor, a diode, a transistor and a bond pad.

Claim 73 (previously presented): A waveguide photodetector comprising:

a waveguide comprising:

a core comprised of a germanium on silicon heterojunction wherein a plurality of regions in the silicon of the heterojunction comprise a plurality of dopants introduced at the same time as the introduction of a plurality of dopants into a plurality of regions in the silicon body of a transistor and wherein the transistor is external to the waveguide and displaced from the waveguide, and

a cladding comprised of a plurality of dielectric materials;

a first plurality of electrical contacts coupled to the germanium; and,

a second plurality of electrical contacts coupled to the silicon.